NATIONAL TRANSPORTATION SAFETY BOARD

SPECIAL STUDY

FATALITY RATES

FOR

SURFACE FREIGHT TRANSPORTATION

1963 TO 1968

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D. C. 20591

REPORT NUMBER: NTSB-STS-71-4

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ADOPTED: AUGUST 18, 1971

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The report discusses the need for an index of safety for freight transportation, suggests that the appropriate index might be "Fatalities per Billion Ton-Miles," and then calculates these statistics for the surface modes of transportation. A technical appendix, which discusses data limitations, is included.

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Adopted: August 18, 1971

FATALITY RATES
for
SURFACE FREIGHT TRANSPORTATION
1963 to 1968

Observation and investigation by the National Transportation Safety Board show that there is substantial interest by the public and public agencies in the relative safety of the various modes of passenger transportation. The existence of a large body of statistical data and the extensive analysis of passenger loss rates is evidence of this interest by the public. As a result of this interest, the Congress, the Department of Transportation, and the various segments of the transportation industry have taken many positive actions to improve the safety of passenger transportation.

However, the Board is concerned about the degree to which safety is being considered during the development of government policies and programs that affect freight transportation. It seems to us that one of the first requirements for the effective use of safety data in the shaping of a national transportation policy is that the relevant data be available. However, our search of available published data, from both government and private sources, indicates that, in the freight transportation area, fatality rate information that would facilitate meaningful comparisons is not readily available. Our research uncovered only one example of this information; it was contained in the statement of the Federal Railroad Administrator on H. R. 16980, the proposed "Federal Railroad Safety Act of 1968," before the Committee on Interstate and Foreign Commerce of the House of Representatives, May 21, 1968. Appendix A-4 of that statement shows the "Adjusted Train Accidents per Billion Gross Ton Miles" for the years 1961 through 1967.

Because fatality rates appear not to have been calculated for the other modes of transportation, we have calculated them for the various surface modes of freight transportation in the United States for the years 1963 through 1968. The results are shown on the attached graph. The data sources, the limitations on the data available, the assumptions that were made, the details of the data adjustments deemed necessary, and calculations made are shown in the attached technical Appendix.

These calculations show that fluid pipelines are the safest mode of freight transportation; they had an average rate of only .011 fatalities per billion ton-miles moved during the 6 years studied. Though based upon incomplete data, marine transportation was next with an average fatality rate of .31 deaths per billion ton-miles. For reasons that are stated in the Appendix, this is a conservative (high) estimate of the fatality rate for this method of transportation.

The railroad industry had a very stable fatality rate, fluctuating between 2.4 and 2.6 deaths per billion ton-miles.

Class I and II intercity common and contract motor carriers report their losses to the Bureau of Motor Carrier Safety, which summarizes and publishes the results. Unfortunately, no such compilation of loss data is readily available for private or exempt carriage. For this reason, a fatality rate could be calculated for only the Federally regulated interstate segment of the trucking industry. During the years studied, this segment of the industry generated from 36 to 39 percent of the highway ton-miles.

The Federally regulated interstate trucking industry had the highest rate, with an average of 10.9 deaths per billion ton-miles.

We recognize that there are many factors that influence the choice of mode for a particular freight shipment. These may include the physical characteristics of the commodity, the freight rate or cost structure for a particular mode, the reliability or level of service provided, and other competitive considerations. However, we cannot overlook the fact that the ratio between the most safe and the least safe method of surface freight transportation is approximately 1,000 to one.

As a result of this study, the National Transportation Safety Board recommends that:

1. The Department of Transportation develop and publish, on a regular basis, comparable data on the losses and loss rates associated with all modes of freight transportation. This data should include losses in all forms: death, injury, property damage, and delays due to accidents.

2. Safety, for both the employees in a segment of the transportation industry and for the general public, be given active consideration during the formulation and implementation of all aspects of national transportation policy.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

/s/ JOHN H. REED
Chairman

/s/ FRANCIS H. McADAMS
Member

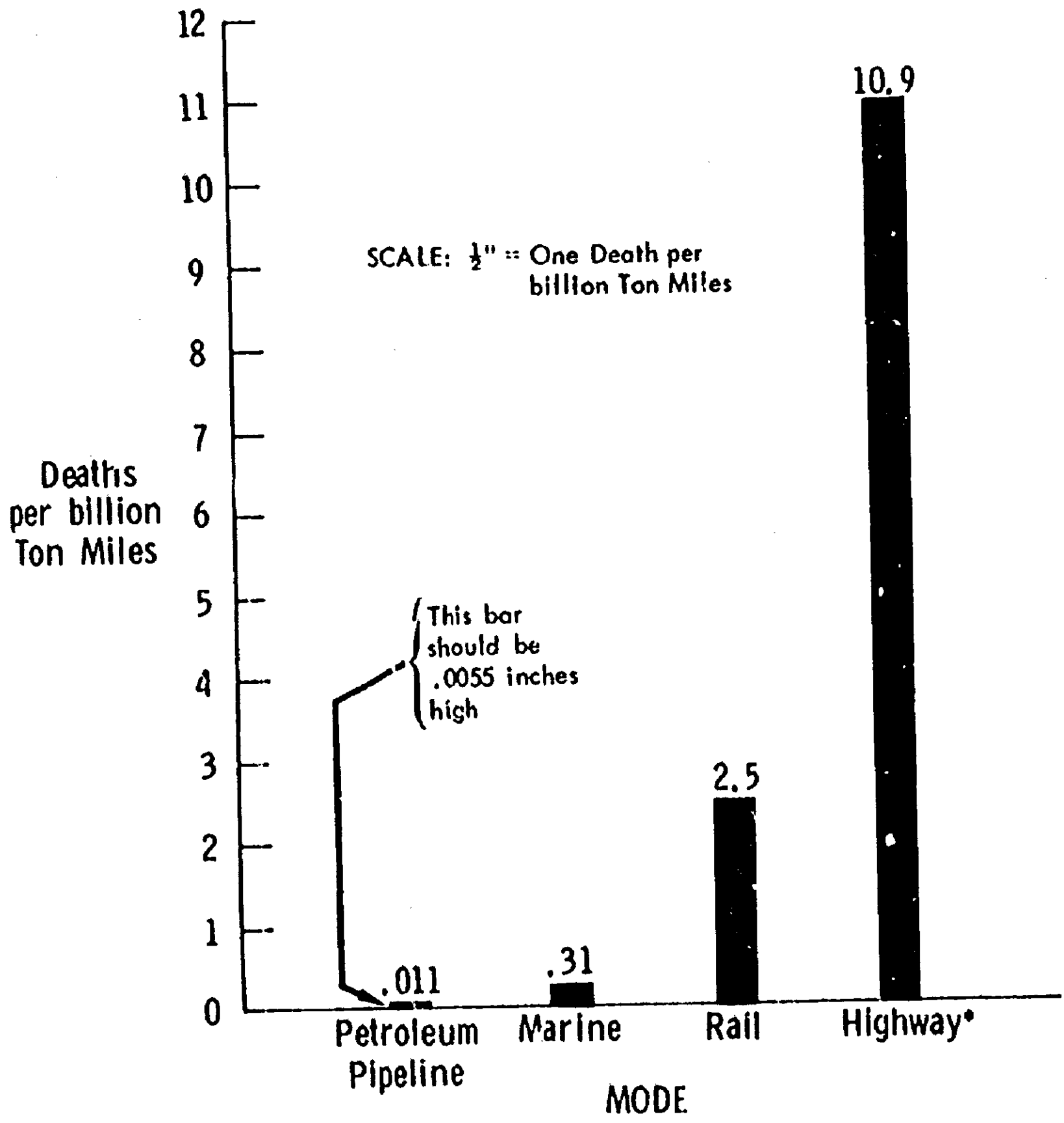
/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

Oscar M. Laurel, Member, was absent, not voting.

FREIGHT TRANSPORTATION FATALITY RATES

SIX YEAR AVERAGE, 1963 - 1968



*Federally regulated carriers only

APPENDIX

TECHNICAL NOTES
on
THE CALCULATION
of
FATALITY RATES
for
SURFACE FREIGHT TRANSPORTATION

1963 through 1968

NATIONAL TRANSPORTATION SAFETY BOARD

June 1971

This Appendix discusses the sources for the data and the rationale for the calculations shown on the attached tables.

From time to time, the Bureau of Economics of the Interstate Commerce Commission summarizes the ton-mile freight statistics for all modes of transportation, both regulated and unregulated, in Transport Economics. The transportation production data for this study were obtained from the following issues of Transport Economics:

Year	Issue
1963	December 1965, p. 2
1964	September 1967, p. 10
1965	January 1968, p. 8
1966	November-December 1969, p. 12
1967	November-December 1969, p. 12
1968	November-December 1969, p. 11

With a few minor discrepancies, the same data appear in Transportation Facts and Trends, published by the Transport Association of America.

For the purpose of this study, fatalities include all persons killed as a result of the transportation of freight. Included are vehicle operators, crewmembers, pedestrians, bystanders, and people in or on other vehicles of either the same or different modes of transportation. Thus, fatalities associated with grade-crossing accidents are included in both the railroad and the highway data discussed below.

Data about fatalities in the railroad industry are published annually by the Federal Railroad Administration in Accident Bulletin, Summary and Analysis of Accidents on Railroads in the United States. For the purposes of this study, the total number of persons killed in railroad accidents (Table 16, p. 5) must be reduced by the number of deaths associated with passenger train operations. This information is available in Table 108, p. 20. Subtracting the passenger train deaths yields a figure that is a conservative base for the calculation of a freight traffic loss rate, for it includes all those killed in non-train accidents and in an accident involving a passenger train and another type of train. This figure also includes deaths from highway grade-crossing accidents that involve a freight train or yard movement.

The Bureau of Motor Carrier Safety (BMCS) publishes a report entitled Accidents of Large Motor Carriers of Property which shows

the number of "carriers' drivers" and "all persons" killed in moving vehicle accidents. The "all persons" category was used for this study. This figure includes deaths from railroad/highway grade-crossing accidents.

The BMCS report relates to interstate motor carriers of property having annual operating revenues of $200,000 or more. This corresponds to the Interstate Commerce Commission's Class I and II intercity common and contract motor carriers. The Federally regulated motor ton-mile figures published in Transport Economics include an estimate of the ton-miles for Class III highway carriers; these carriers have an annual operating revenue of less than $200,000. This introduces a slight bias in the Federally regulated highway freight fatality rate. In other words, the calculated fatality rate is slightly lower than it would be if the transportation production figures were restricted to Class I and II motor carriers.

During the years covered by this study, Federally regulated motor carriers generated from 36 to 39 percent of the total highway ton-miles. However, no government agency collects accident data for private or exempt carriers. For this reason, it is not possible to calculate the fatality loss rate for the largest segment of highway freight transportation.

The fatality rate for the Federally regulated trucking industry decreased by 20 percent between 1963 and 1968. One possible explanation for this decrease is the fact that an increasing proportion of regulated highway truck traffic is being handled on the Interstate Highway System.

The Federal Power Commission is responsible for the economic regulation of the natural gas segment of the pipeline industry. They do not collect transmission figures on a ton-mile basis. Thus it is not possible to calculate a comparable freight transportation fatality rate for this segment of the pipeline industry.

Transport Economics does include ton-mile figures for the liquid petroleum industry.

Prior to January 1, 1968, the pipeline industry did not have to report pipeline accidents to the Federal government. For this reason, a press release by the American Petroleum Institute has been used as a source for fatality data in this segment of the transportation industry.

Each year the U. S. Coast Guard publishes a "Statistical Summary of Deaths/Injuries Due to a Vessel Casualty" and a "Statistical Summary of Deaths on Board Commercial Vessels (Not Involving a Vessel Casualty)"

in the Proceedings of the Merchant Marine Council. The fatality figures used for this study were obtained by adding the figures from both tables for freight ships, cargo barges, tankships, tank barges, and tugs. These figures are not broken down by the Coast Guard by geographic area. They include all losses sustained in water transportation, whether on inland waterways or the high seas.

The water traffic ton-mile figures published in Transport Economics include coastwise, intercoastal, inland waterways, and Great Lakes traffic. They also include an estimate for the ton-miles generated by "foreign water traffic" (traffic with one foreign and one U. S. terminus) in U. S. waters. However, no estimate is available for the ton-miles generated by the U. S. Merchant Marine on the high seas. Because of this gap in the available data, the ton-mile fatality rate for marine transportation may be substantially overstated.

Fatality rates for air freight transportation have not been calculated for two reasons:

1. a very large proportion of air freight is handled on passenger flights; and

2. the residue, which is handled on exclusively cargo aircraft, is a minuscule percentage of the nation's freight traffic measured in ton-miles.

DEATHS PER BILLION TON-MILES
for
SURFACE TRANSPORTATION
1963 - 1968

	1963	1964	1965	1966	1967	1968	SIX YEAR WEIGHTED AVERAGE	RATIO BETWEEN WEIGHTED AVERAGE RATES
Pipeline, Petroleum	.008	.000	.013	.006	.008	.028	.011	28.2
Marine	.35	.32	.31	.28	.31	.26	.31	8.1
Railroad	2.4	2.6	2.4	2.6	2.6	2.4	2.5	4.4
Highway (Federally regulated carriers only)	12.0	11.8	11.4	10.3	10.6	9.5	10.9	

CALCULATION OF FREIGHT TRANSPORTATION FATALITY RATE

	1963	1964	1965	1966	1967	1968	SIX-YEAR TOTALS AND RATES	REFERENCES
Railroad								
Ton-Miles (in billions)	629.3	666.2	709.7	750.8	731.2	756.8	4,243.0	1
Total killed, all accidents	2141	2423	2399	2684	2483	2359		2
Less: Killed in accidents involving passenger trains only	634	66[illegible]	670	710	604	506		3
Net: Killed in freight or maintenance service	1507	1754	1729	1974	1879	1853	10,696	4
Deaths per billion ton-miles	2.4	2.6	2.4	2.6	2.6	2.4	2.5	
Highway								
(Federally regulated carriers only)								
Ton-miles (in billions)	120.6	126.4	140.3	143.1	139.9	155.4	825.7	1
Deaths, all persons	1451	1492	1603	1472	1489	1482	8989	5
Deaths per billion ton-miles	12.0	11.8	11.4	10.3	10.6	9.5	10.9	
Total ton-miles all intercity highway freight traffic (in billions)	331.8	356.3	359.2	380.9	388.5	396.3		1
Percent of intercity highway freight traffic Federally regulated	36%	36%	39%	38%	36%	39%		

CALCULATION OF FREIGHT TRANSPORTATION FATALITY RATE
(CONTINUED)

	1963	1964	1965	1966	1967	1968	SIX-YEAR TOTALS AND RATES	REFERENCES
Marine								1,6
Domestic	480.6	488.8	489.8	507.1	515.4	522.0		1,7
Foreign (in U. S. waters)	46.9	53.7	55.5	57.9	54.7	59.0		
Total ton-miles (in billions)	527.5	542.5	545.3	565.0	570.1	581.0	3,331.4	8
Total deaths	182	176	168	161	179	153	1019	
Deaths per billion ton-miles	.35	.32	.31	.28	.31	.26	.31	
Pipeline, Petroleum								
Ton-miles (in billions)	253.4	268.7	306.4	332.9	361.0	391.3	1,913.7	1
Deaths	2	0	4	2	3	11	22	9
Deaths per billion ton-miles	.008	.000	.013	.008	.008	.028	.011	

References

1. Transport Economics, Bureau of Economics, Interstate Commerce Commission. Data sources:

Year	Issue
1963	Dec. 1965, p. 3
1964	Sept. 1967, p. 10
1965	Jan. 1968, p. 8
1966	Nov. - Dec. 1969, p. 12
1967	Nov. - Dec. 1969, p. 11

2. Accident Bulletin, Summary and Analysis of Accidents on Railroads in the United States, Federal Railroad Administration, Washington, D. C., Table 16, p. 5

3. Same source, Table 108, p. 20.

4. This figure is a conservative base for the calculation of a loss rate, for it includes those killed in non-train accidents and in an accident involving a passenger train and another type of train. This figure also includes deaths from highway grade-crossing accidents that involve a freight train or yard movement.

5. Accidents of Large Motor Carriers of Property, Bureau of Motor Carrier Safety, Washington, D. C., Table 1. Includes deaths from railroad/highway grade-crossing accidents.

6. Includes coastwise, intercoastal, inland waterways, and Great Lakes traffic, but not water traffic in U. S. waters with one foreign and one U. S. terminus.

7. Water traffic in U. S. waters with one foreign and one U. S. terminus.

8. Merchant Marine Council Proceeding of the U. S. Coast Guard, Washington, D. C., Fiscal Year Basis. Includes freight vessels, cargo barges, tankships, tank barges, and tugs. Includes both deaths due to a vessel casualty and deaths not involving a vessel casualty. Excludes suicide, homocide, and death from natural causes.

9. Press release, American Petroleum Institute.

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